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मानक

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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 15622 (2006): Pressed ceramic tiles [CED 5: Flooring, Wall Finishing and Roofing]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS 15622 : 2006

(Superseding IS 13753 : 1993, IS 13754 : 1993,
IS 13755 : 1993 and IS 13756 : 1993)

भारतीय मानक

प्रैस्ड सिरैमिक टाइलें — विशिष्टि

Indian Standard

PRESSED CERAMIC TILES — SPECIFICATION

ICS 91.100.23

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

May 2006

Price Group 7

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Flooring, Wall Finishing and Roofing Sectional Committee had been approved by the Civil Engineering Division Council.

It was seen that there were four separate specifications of ceramic tiles based on different percentage of water absorption, namely:

<i>IS No.</i>	<i>Title</i>
13753 : 1993	Specification for dust pressed ceramic tiles with water absorption of $E > 10\%$ (Group B III)
13754 : 1993	Specification for dust pressed ceramic tiles with water absorption of $6\% < E \leq 10\%$ (Group B II b)
13755 : 1993	Specification for dust pressed ceramic tiles with water absorption of $3\% < E \leq 6\%$ (Group B II a)
13756 : 1993	Specification for dust pressed ceramic tiles with low water absorption of $E \leq 3\%$ (Group B I)

In place of separate specification for each category, it was suggested to bring out a general specification for ceramic tiles for different water absorption categories to cover all the important requirements. Accordingly efforts were made to bring out this standard, which supersedes IS 13753, IS 13754, IS 13755 and IS 13756.

The following major changes have been incorporated in this standard:

- Title of the standard has been changed from dust pressed ceramic tiles to pressed ceramic tiles.
- Requirements given in IS 13753 to IS 13756 have been clubbed in one volume at the time of preparation of this standard.
- Category of the ceramic tiles with water absorption less than 3 percent as per the existing IS 13756 have now been changed to two categories, namely, one for the range of water absorption 0.08 to 3 percent and another having range of less than 0.08 percent.
- Category of the ceramic tiles with water absorption 6 to 10 percent have now been omitted which were covered as per the existing standard IS 13754.
- Certain modular preferred sizes as well as non-modular sizes for the tiles having the varying water absorption have been added in the tables.
- Test requirements for the ceramic tiles having the different water absorption capacity have been modified at number of places to bring in line with latest practice being followed in the country.

In formulation of this standard considerable assistance have been derived from ISO 13006 'Ceramic tiles — Definition, classifications, characteristics and marking' and ISO 10545 (Parts 1 to 14) 'Ceramic tiles — Tests'.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PRESSED CERAMIC TILES — SPECIFICATION

1 SCOPE

1.1 This standard specifies sizes, dimensional tolerances, mechanical, physical and chemical requirements, surface quality requirements and marking of ceramic tiles.

1.2 It is applicable only to pressed ceramic glazed/unglazed tiles of first quality for use as both floors and walls coverings.

1.3 There is a small production of pressed ceramic unglazed tiles with water absorption greater than 10 percent, that is, not covered by this standard.

2 REFERENCES

The standards given at Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 DEFINITIONS

3.1 The definition of pressed ceramic tiles is given in IS 13712.

3.2 The surface of tiles and components belonging to this group can be smooth, profiled, wavy, decorated or finished in some other way. It can be unglazed (UGL), glossy, matt or semi-matt (GL).

3.3 Tiles may have spacer lugs.

4 SHAPES AND SIZES

4.1 For shapes and sizes, *see* Fig. 1 and Fig. 2 and the following:

- a) Tables 1 and 2 : For tiles with water absorption, $E > 10$ percent (Group B III),
- b) Tables 3 and 4 : For tiles with water absorption, $3 < E \leq 6$ percent (Group B II),
- c) Tables 5 and 6 : For tiles with water absorption, $0.08 < E \leq 3$ percent (Group B I b),
- d) Tables 7 and 8 : For tiles with water absorption, $E \leq 0.08$ percent (Group B I a).
- e) Tables 1, 3, 5, and 7 give the modular preferred sizes, and

- f) Tables 2, 4, 6, and 8 give the most common non-modular sizes.

4.2 Other Sizes

For pressed tiles with dimensions other than those given in Tables 1, 3, 5, 7 and Tables 2, 4, 6, 8, the work size shall be stated by the manufacturer. The relevant requirements for work size and thickness given in the respective tables are applicable.

4.3 Spacer Lug Tiles

4.3.1 Spacer lugs are projections, usually 0.6 mm that are located along certain edges of tiles so that when two tiles are placed together in line, the lugs on adjacent edges separate the tiles by a distance not less than the specified width of joints (*see* Fig. 2). Lugs are positioned so that the joint between the tiles may be filled with grout without the lugs remaining exposed.

4.3.2 Pressed tiles may be made with other spacer lug systems and in such cases the manufacturer's work size shall apply.

NOTE — Some tiles have one or more manufacturing projections part way along certain edges and smaller than 0.3 mm. These are not intended as spacer lugs and shall not be used to space joints.

4.4 Accessories

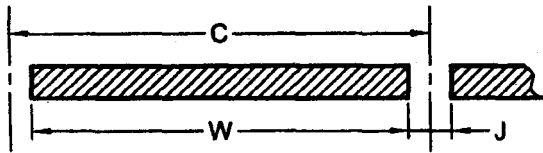
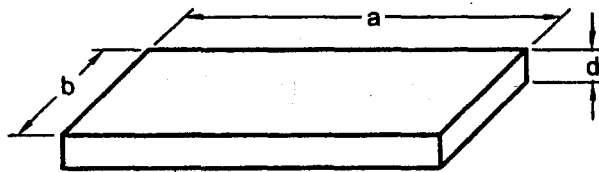
Dimensions and tolerances of accessories, for example, soap-holder, are not standardized, and these shall be stated by the manufacturer, where appropriate.

5 REQUIREMENTS

5.1 Dimensional and surface quality requirements and physical and chemical properties are given in the following tables:

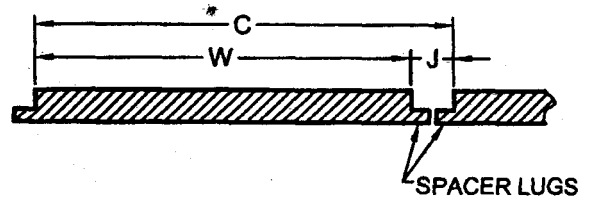
- a) Table 9 : For tiles with water absorption $E > 10$ percent (Group B III),
- b) Table 10 : For tiles with water absorption $3 < E \leq 6$ percent (Group B II),
- c) Table 11 : For tiles with water absorption $0.08 < E \leq 3$ percent (Group B I b), and
- d) Table 12 : For tiles with water absorption $E \leq 0.08$ percent (Group B I a).

5.2 Sampling and basis for acceptance shall be in accordance with IS 13630 (Part 15).



Co-ordinating Size (C) = Work Size (W) + Joint Width (J) Work Size (W) = Dimensions of the Visible Faces a and b

FIG. 1 TILE



Co-ordinating Size (C) = Work Size (W) + Joint Width (J) Work Size (W) = Dimensions of the Visible Faces a and b

FIG. 2 TILE WITH SPACE LUGS

Table 1 Modular Preferred Sizes for Tiles with Water Absorption, E > 10 Percent (Group B III)
(Clause 4.1)

Coordinating Size (C) cm	Work Size (W)		Thickness (d) mm
	Length (a) mm	Width (b) mm	
(1)	(2)	(3)	(4)
M30 × 30 M30 × 15 M25 × 15 M20 × 20 M20 × 15 M20 × 10 M15 × 15 M10 × 10	The manufacturer shall choose the work size in order to allow a nominal joint width between 1.5 mm and 5 mm		The thickness shall be specified by the manufacturer. It includes the profile on the visible face and on the rear side

**Table 2 Non-modular Sizes for Tiles with Water Absorption,
E > 10 Percent (Group B III)**

(Clause 4.1)

Nominal Size (N) cm	Work Size (W)		Thickness (d) mm
	Length (a) mm	Width (b) mm	
(1)	(2)	(3)	(4)
40 × 40 32 × 48 32 × 60 32 × 40 33 × 33 31.5 × 42 32 × 32 30 × 30 30 × 15 25 × 25 21.6 × 10.8 20 × 40 20 × 30 20 × 20 20 × 15 15.2 × 15.2 15.2 × 7.6 15 × 15 15 × 7.5 10.8 × 10.8 10 × 20	<p>The manufacturer shall choose the work size in such a way that the difference between the work size and the nominal size is not more than ± 2 percent and 5 mm</p> <p>For spacer lug tiles, one work size shall apply for each nominal size within the limits mentioned above</p>		<p>The thickness shall be specified by the manufacturer. It includes the profile on the visible face and on the rear side</p>

**Table 3 Modular Preferred Sizes for Tiles with Water Absorption,
3 < E ≤ 6 Percent (Group B II)**

(Clause 4.1)

Coordinating Size (C) cm	Work Size (W)		Thickness (d) mm
	Length (a) mm	Width (b) mm	
(1)	(2)	(3)	(4)
M10 × 10 M15 × 15 M20 × 10 M20 × 15 M20 × 20 M30 × 30 M40 × 40 M45 × 45	<p>The manufacturer shall choose the work size in order to allow a nominal joint width between 2 mm and 5 mm</p>		<p>The thickness shall be specified by the manufacturer. It includes the profile on the visible face and on the rear side</p>

**Table 4 Non-modular Sizes for Tiles with Water Absorption,
3 < E ≤ 6 Percent (Group B II)**

(Clause 4.1)

Nominal Size (<i>N</i>) cm (1)	Work Size (<i>W</i>)		Thickness (<i>d</i>) mm (4)
	Length (<i>a</i>) mm (2)	Width (<i>b</i>) mm (3)	
10 × 10 15 × 7.5 15 × 10 15 × 15 15.2 × 7.6 15.2 × 15.2 20 × 10 20 × 20 25 × 25 30 × 15 30 × 20 30 × 30 30.6 × 30.6 31.5 × 31.5 40 × 30 40 × 40 40.6 × 40.6	The manufacturer shall choose the work size in such a way that the difference between the work size and the nominal size is not more than ±2 percent and 5 mm		The thickness shall be specified by the manufacturer. It includes the profile on the visible face and on the rear side

**Table 5 Modular Preferred Sizes for Tiles with Water Absorption,
0.08 < E ≤ 3 Percent (Group B I b)**

(Clause 4.1)

Coordinating Size (<i>C</i>) cm (1)	Work Size (<i>W</i>)		Thickness (<i>d</i>) mm (4)
	Length (<i>a</i>) mm (2)	Width (<i>b</i>) mm (3)	
M10 × 10 M15 × 15 M20 × 10 M20 × 15 M20 × 20 M30 × 30	The manufacturer shall choose the work size in order to allow a nominal joint width between 2 mm and 5 mm		The thickness shall be specified by the manufacturer. It includes the profile on the visible face and on the rear side

**Table 6 Non-modular Sizes for Tiles with Water Absorption,
0.08 < E ≤ 3 Percent (Group B I b)**

(Clause 4.1)

Nominal Size (<i>N</i>) cm (1)	Work Size (<i>W</i>)		Thickness (<i>d</i>) mm (4)
	Length (<i>a</i>) mm (2)	Width (<i>b</i>) mm (3)	
10 × 10 15 × 7.5 15 × 10 15 × 15 15.2 × 7.6 15.2 × 15.2 20 × 10 20 × 20 25 × 25 30 × 15 30 × 20 30 × 30 40 × 30 45 × 45 60 × 60	The manufacturer shall choose the work size in such a way that the difference between the work size and the nominal size is not more than ±2 percent and 5 mm		The thickness shall be specified by the manufacturer. It includes the profile on the visible face and on the rear side

**Table 7 Modular Preferred Sizes for Tiles with Water Absorption,
E ≤ 0.08 Percent (Group B I a)**

(Clause 4.1)

Coordinating Size (<i>C</i>) cm (1)	Work Size (<i>W</i>)		Thickness (<i>d</i>) mm (4)
	Length (<i>a</i>) mm (2)	Width (<i>b</i>) mm (3)	
M10 × 10 M15 × 15 M20 × 10 M20 × 15 M20 × 20 M30 × 30 M45 × 45	The manufacturer shall choose the work size in order to allow a nominal joint width between 2 mm and 5 mm		The thickness shall be specified by the manufacturer. It includes the profile on the visible face and on the rear side

**Table 8 Non-modular Sizes for Tiles with Water Absorption,
E ≤ 0.08 Percent (Group B I a)**
(Clause 4.1)

Nominal Size (N) cm (1)	Work Size (W)		Thickness (d) mm (4)
	Length (a) mm (2)	Width (b) mm (3)	
10 × 10 15 × 7.5 15 × 10 15 × 15 15.2 × 7.6 15.2 × 15.2 20 × 10 20 × 20 25 × 25 30 × 15 30 × 20 30 × 30 40 × 30 60 × 60 60 × 90 90 × 90 90 × 120	The manufacturer shall choose the work size in such a way that the difference between the work size and the nominal size is not more than ±2 percent and 5 mm		The thickness shall be specified by the manufacturer. It includes the profile on the visible face and on the rear side

**Table 9 Test Requirements for Pressed Tiles with Water Absorption,
E > 10 Percent (Group B III)**
(Clause 5.1)

Characteristics (1)	Requirements (2)	Method of Test, Ref to Part of IS 13630 (3)
A) Dimensions and Surface Quality i) <i>Length and width:</i> a) The deviation in percent of the average size of each tile (2 or 4 sides) from the work size (W) Tile with spacer lugs b) The deviation in percent of the average size of each tile (2 or 4 sides) from the average size of the 10 test specimen (20 or 40 sides) Tile with spacer lugs ii) <i>Thickness:</i> The deviation, in percent of the average thickness of each tile from the work size thickness. a) < 250 cm ² b) > 250 to 500 cm ² c) > 500 to 1 000 cm ² d) > 1 000 cm ²	$I \leq 12 \text{ cm} : \pm 0.5$ ¹⁾ $I > 12 \text{ cm} : \pm 0.2$ $+0.6 / -0.3$ $I \leq 12 \text{ cm} : +0.4 / -0.2$ $I > 12 \text{ cm} : \pm 0.15$ ± 0.25 ± 3.0 ± 3.0 ± 4.0 ± 4.0	Part I

Table 9 (Concluded)

Characteristics (1)	Requirements (2)	Method of Test, Ref to Part of IS 13630 (3)
iii) <i>Straightness of sides</i> ²⁾ (<i>Facial sides</i>): The maximum deviation from straightness, in percent related to the corresponding work sizes iv) <i>Rectangularity</i> ²⁾ : The maximum deviation from rectangularity in percent related to the corresponding work sizes Tile with spacer lugs v) <i>Surface flatness</i> : The maximum deviation from flatness, in percent: a) Centre curvature, related to diagonal calculated from the work sizes b) Edge curvature, related to the corresponding work size c) Warpage, related to the diagonal calculated from the work sizes. vi) <i>Surface quality</i>	±0.15 ±0.15 ±0.15 ±0.22 ±0.22 ±0.22 Minimum 95 percent of tiles shall be free from visible defects that would impair the appearance of a major area of tiles.	Part 1
B) Physical Properties i) Water absorption, percent by mass ii) Modulus of rupture, in N/mm ² iii) Breaking strength, in N iv) Moisture expansion, in mm/m v) Scratch hardness of surface (Mohs) vi) Co-efficient of linear thermal expansion from ambient temperature to 100°C vii) Thermal shock resistance viii) Craze resistance ³⁾	≥ 10 percent, when the value exceeds 20 percent this shall be indicated by the manufacturer. (Average 10 percent) Average 12 for thickness < 7.5 mm Average 15 for thickness ≥ 7.5 mm 200 for ≤ 7.5 mm thickness, <i>Min</i> 500 for > 7.5 mm thickness, <i>Min</i> 0.04 3, <i>Min</i> 9 × 10 ⁻⁶ K ⁻¹ , <i>Max</i> 10 cycles, <i>Min</i> 4 cycles @ 7.5 bar, <i>Min</i>	Part 2 Part 6 Part 3 Part 13 Part 4 Part 5 Part 9
C) Chemical Properties i) Resistance to staining of glazed tiles ii) Resistance to household chemicals and swimming pool water cleansers except to cleansing agents containing hydrofluoric acid and its compounds iii) Resistance to acids and alkalis (with the exceptions of hydrofluoric acid and its compounds)	Class 1, <i>Min</i> Class AA, <i>Min</i> Required if agreed, according to the chemical resistance class indicated by the manufacturer.	Part 8

¹⁾ For tiles having one or more adjacent glazed tiles.

²⁾ Not applicable for tiles having curved shapes.

³⁾ Certain decorative effects may have a tendency to craze. These shall be identified by the manufacturer, in which case the crazing test is not applicable.

**Table 10 Test Requirements for Pressed Tiles with Water Absorption
3 < E ≤ 6 Percent (Group B II)**

(Clause 5.1)

Characteristics (1)	Surface of the Product(s)				Method of Test, Ref to Part of IS 13630 (6)
	S ≤ 90 cm ² (2)	90 < S ≤ 190 cm ² (3)	190 < S ≤ 410 cm ² (4)	S > 410 cm ² (5)	
A) Dimensions and Surface Quality					} Part 1
i) <i>Length and width</i>					
a) The deviation in percent of the average size of each tile (2 or 4 sides) from the work size (W):					
1) Unrectified	± 1.0	± 0.75	± 0.4	± 0.4	
2) Rectified	± 0.5	± 0.3	± 0.1	± 0.1	
b) The deviation in percent of the average size of each tile (2 or 4 sides) from the average size of the 10 test specimen (20 or 40 sides):					
1) Unrectified	± 0.6	± 0.5	± 0.4	± 0.4	
2) Rectified	± 0.3	± 0.3	± 0.1	± 0.1	
ii) <i>Thickness</i>					
The deviation, in percent of the average thickness of each tile from the work size thickness	± 10	± 10	± 5	± 5	
iii) <i>Straightness of sides¹⁾ (Facial sides)</i>					
The maximum deviation from straightness, in percent related to the corresponding work sizes:					
a) Unrectified	± 0.5	± 0.4	± 0.3	± 0.3	
b) Rectified	± 0.3	± 0.3	± 0.1	± 0.1	
iv) <i>Rectangularity¹⁾</i>					
The maximum deviation from rectangularity in percent related to the corresponding work sizes:					
a) Unrectified	± 0.8	± 0.4	± 0.3	± 0.3	
b) Rectified	± 0.3	± 0.3	± 0.1	± 0.1	
v) <i>Surface flatness</i>					
The maximum deviation from flatness, in percent					
a) Centre curvature, related to diagonal calculated from the work sizes	± 1.0	± 0.5	± 0.5	± 0.5	
b) Edge curvature, related to the corresponding work size	± 1.0	± 0.5	± 0.5	± 0.5	
c) Warpage, related to the diagonal calculated from the work sizes	± 1.0	± 0.5	± 0.5	± 0.5	
vi) <i>Surface quality²⁾</i>	Minimum 95 percent of tiles shall be free from visible defects that would impair the appearance of a major area of tiles.				
B) Physical Properties					} Part 6
i) Water absorption, percent by mass	Average 3 < E ≤ 6, Individual maximum 6.2				
ii) Modulus of rupture, in N/mm ² iii) Breaking strength, in N	Average 30, Individual 28, <i>Min</i> ≤ 7.5 mm thickness : 500, <i>Min</i> > 7.5 mm thickness : 1 000, <i>Min</i>				

Table 10 (Concluded)

Characteristics (1)	Surface of the Product(s)				Method of Test, Ref to Part of IS 13630 (6)
	S ≤ 90 cm ² (2)	90 < S ≤ 190 cm ² (3)	190 < S ≤ 410 cm ² (4)	S > 410 cm ² (5)	
iv) <i>Scratch hardness of surface (Mohs' scale)</i>					
a) Commercial application	7, <i>Min</i>				Part 13
b) Home	5, <i>Min</i>				
1) Glazed, and					
2) Unglazed tiles					
v) <i>Resistance to abrasion of glazed tiles Class I to V</i>					
a) Commercial application	IV, <i>Min</i>				Part 11
b) Residential applications	II, <i>Min</i>				
vi) Co-efficient of linear thermal expansion from ambient temperature to 100°C (K ⁻¹)					
vii) Thermal shock resistance	9 × 10 ⁻⁶ , <i>Max</i>				Part 4
viii) <i>Crazing resistance³⁾ glazed tiles</i>	10 Cycles, <i>Min</i>				Part 5
ix) <i>Frost resistance</i>	4 Cycles at 7.5 Bar, <i>Min</i>				Part 9
	Required, if agreed				Part 10
C) Chemical Properties					
i) Resistance to staining of glazed tiles	Class 1, <i>Min</i>				} Part 8
ii) Resistance to household chemicals and swimming pool water cleansers except to cleansing agents containing hydrofluoric acid and its compounds					
Glazed tiles (Unglazed tiles)	Class AA, <i>Min</i>				
iii) Resistance to acids and alkalis (with the exceptions of hydrofluoric acid and its compounds)	Required, if agreed according to the chemical resistance class indicated by the manufacturer				
Glazed tiles					

¹⁾ Not applicable for tiles having curved shapes.

²⁾ Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of pressed tiles of low water absorption (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area, which is characteristic for this type of tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

³⁾ Certain decorative effects may have a tendency to craze. These shall be identified by the manufacturer, in which case the crazing test is not applicable.

Table 11 Test Requirements for Pressed Tiles with Water Absorption
0.08 < E ≤ 3 Percent (Group B I b)

(Clause 5.1)

Characteristics (1)	Surface of the Product(s)				Method of Test, Ref to Part of IS 13630 (6)
	S ≤ 90 cm ² (2)	90 < S ≤ 190 cm ² (3)	190 < S ≤ 410 cm ² (4)	S > 410 cm ² (5)	
A) Dimensions and Surface Quality					Part 1
i) <i>Length and width</i>					
a) The deviation in percent of the average size of each tile (2 or 4 sides) from the work size (<i>W</i>)	± 1.0	± 0.75	± 0.2	± 0.1	
b) The deviation in percent of the average size of each tile (2 or 4 sides) from the average size of the 10 test specimen (20 or 40 sides)	± 0.6	± 0.3	± 0.2	± 0.1	
ii) <i>Thickness</i>					
The deviation, in percent of the average thickness of each tile from the work size thickness	± 5	± 5	± 4	± 4	
iii) <i>Straightness of sides</i> ¹⁾ (<i>Facial sides</i>)					
The maximum deviation from straightness, in percent related to the corresponding work sizes	± 0.5	± 0.4	± 0.3	± 0.1	
iv) <i>Rectangularity</i> ¹⁾					
The maximum deviation from rectangularity in percent related to the corresponding work sizes	± 0.8	± 0.4	± 0.3	± 0.1	
v) <i>Surface flatness</i>					
The maximum deviation from flatness, in (percent):					
a) Centre curvature, related to diagonal calculated from the work sizes	± 0.8	± 0.4	± 0.3	± 0.2	
b) Edge curvature, related to the corresponding work size	± 0.8	± 0.4	± 0.3	± 0.2	
c) Warpage, related to the diagonal calculated from the work sizes	± 0.8	± 0.4	± 0.3	± 0.2	
vi) <i>Surface quality</i> ²⁾	Minimum 95 percent of tiles shall be free from visible defects that would impair the appearance of a major area of tiles				
B) Physical Properties					Part 2 Part 6 Part 3 Part 13 Part 11
i) Water absorption, percent by mass	Average ≤ 3, Individual maximum, 3.3				
ii) Modulus of rupture, in N/mm ²	Average 38, Individual minimum 35				
iii) Breaking strength, in N	≤ 7.5 mm thickness : 600, <i>Min</i> > 7.5 mm thickness : 1200, <i>Min</i>				
iv) Moisture expansion, in mm/m	0.02, <i>Max</i>				
v) <i>Scratch hardness of surface (Mohs' scale)</i>					
a) Commercial application	6, <i>Min</i>				
b) Home application	5, <i>Min</i>				
vi) <i>Abrasion resistance</i>					
Resistance to abrasion of glazed tiles Class I to V					
a) Commercial application	III, <i>Min</i>				
b) Home application	II, <i>Min</i>				

Table 11 (Concluded)

Characteristics (1)	Surface of the Product(s)				Method of Test, Ref to Part of IS 13630 (6)
	S ≤ 90 cm ² (2)	90 < S ≤ 190 cm ² (3)	190 < S ≤ 410 cm ² (4)	S > 410 cm ² (5)	
vii) Co-efficient of linear thermal expansion from ambient temperature to 100°C (K ⁻¹)	7 × 10 ⁻⁶ K ⁻¹ , <i>Max</i>				Part 4
viii) Thermal shock resistance	10 Cycles, <i>Min</i>				Part 5
ix) Craze resistance ³⁾ glazed tiles	4 Cycles @ 7.5 bar, <i>Min</i>				Part 9
x) Frost resistance	Required				Part 10
C) Chemical Properties					
i) Resistance to staining of glazed tiles	Class 1, <i>Min</i>				} Part 8
ii) Resistance to household chemicals and swimming pool water cleansers except to cleansing agents containing hydrofluoric acid and its compounds Glazed tiles	Class AA, <i>Min</i>				
iii) Resistance to acids and alkalis (with the exceptions of hydrofluoric acid and its compounds) Glazed tiles	Required, if agreed according to the chemical resistance class indicated by the manufacturer				

¹⁾ Not applicable for tiles having curved shapes.

²⁾ Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of pressed tiles of low water absorption (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area, which is characteristic for this type of tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

³⁾ Certain decorative effects may have a tendency to craze. These shall be identified by the manufacturer, in which case the crazing test is not applicable.

**Table 12 Test Requirements for Pressed Tiles with Water Absorption
E ≤ 0.08 Percent (Group B I a)**

(Clause 5.1)

Characteristics (1)	Surface of the Product(s)				Method of Test, Ref to Part of IS 13630 (6)
	S ≤ 90 cm ² (2)	90 < S ≤ 190 cm ² (3)	190 < S ≤ 410 cm ² (4)	S > 410 cm ² (5)	
A) Dimensions and Surface Quality					Part 1
i) <i>Length and width:</i>					
a) The deviation in percent of the average size of each tile (2 or 4 sides) from the work size (<i>W</i>)	± 1.0	± 0.75	± 0.2	± 0.1	
b) The deviation in percent of the average size of each tile (2 or 4 sides) from the average size of the 10 test specimen (20 or 40 sides)	± 0.6	± 0.3	± 0.2	± 0.1	
ii) <i>Thickness</i> The deviation, in percent of the average thickness of each tile from the work size thickness	± 5	± 5	± 4	± 4	
iii) <i>Straightness of sides</i> ¹⁾ (<i>Facial sides</i>) The maximum deviation from straightness, in percent related to the corresponding work sizes	± 0.5	± 0.4	± 0.3	± 0.1	
iv) <i>Rectangularity</i> ¹⁾ The maximum deviation from rectangularity in percent related to the corresponding work sizes	± 0.8	± 0.4	± 0.3	± 0.1	
v) <i>Surface flatness</i> The maximum deviation from flatness, in (percent):					
a) Centre curvature, related to diagonal calculated from the work sizes	± 0.8	± 0.4	± 0.3	± 0.2	
b) Edge curvature, related to the corresponding work size	± 0.8	± 0.4	± 0.3	± 0.2	
c) Warpage, related to the diagonal calculated from the work sizes	± 0.8	± 0.4	± 0.3	± 0.2	
vi) <i>Surface quality</i> ²⁾	Minimum 95 percent of tiles shall be free from visible defects that would impair the appearance of a major area of tiles				
B) Physical Properties					Part 2 Part 6 Part 13 Part 12 Part 4
i) Water absorption, percent by mass	Average ≤ 0.08, Individual maximum, 1.0				
ii) Modulus of rupture, in N/mm ²	Average 47, Individual minimum 44				
iii) Breaking strength, in N	≤ 7.5 mm thickness : 800, <i>Min</i> > 7.5 mm thickness : 1500, <i>Min</i>				
iv) Scratch hardness of surface (Moh's scale)	6, <i>Min</i>				
v) <i>Abrasion resistance</i> Resistance to deep abrasion of unglazed tiles (Removed volume in mm ³)	100, <i>Max</i>				
vi) Co-efficient of linear thermal expansion from ambient temperature to 100°C (K ⁻¹)	6 × 10 ⁻⁶ K ⁻¹ , <i>Max</i>				

Table 12 (Concluded)

Characteristics (1)	Surface of the Product(s)				Method of Test, Ref to Part of IS 13630 (6)
	$S \leq 90$ cm ² (2)	$90 < S \leq 190$ cm ² (3)	$190 < S \leq 410$ cm ² (4)	$S > 410$ cm ² (5)	
vii) Thermal shock resistance	10 Cycles, <i>Min</i>				Part 5
viii) Frost resistance	Required				Part 10
ix) Impact resistance	Required				Part 14
x) Bulk density, in (g/cc)	2.2, <i>Min</i>				Part 2
C) Chemical Properties					
i) Resistance to household chemicals and swimming pool water cleansers except to cleansing agents containing hydrofluoric acid and its compounds: Unglazed tiles	Required				} Part 7
ii) Resistance to acids and alkalis (with the exceptions of hydrofluoric acid and its compounds): Unglazed tiles	Required ¹⁾				

¹⁾ Not applicable for tiles having curved shapes.

²⁾ Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of pressed tiles of low water absorption (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area, which is characteristic for this type of tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

³⁾ If the hue becomes slightly different this is not considered to be chemical attack.

6 MARKING AND DESIGNATION

6.1 Marking

Ceramic tiles and/or their packaging shall be marked as follows:

- Name and address of the manufacturer and/or trade-mark and the country of origin,
- Batch number/date of manufacture, and
- Designation of tiles as per 6.3.

6.2 BIS Certification Marking

The tiles may also be marked with the Standard Mark.

6.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which a licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6.3 Designation

Tile shall be specified according to the following examples:

Pressed tile, GL B III M 15 cm × 15 cm
(W 148 mm × 148 mm)

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARD

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
13630	Ceramic tiles — Methods of test (<i>first revision</i>):	(Part 9) : 2006	Determination of crazing resistance — Glazed tiles (<i>first revision</i>)
(Part 1) : 2006	Determination of dimensions and surface quality (<i>first revision</i>)	(Part 10) : 2006	Determination of frost resistance (<i>first revision</i>)
(Part 2) : 2006	Determination of water absorption and bulk density (<i>first revision</i>)	(Part 11) : 2006	Determination of resistance to surface abrasion — Glazed tiles (<i>first revision</i>)
(Part 3) : 2006	Determination of moisture expansion using boiling water — Unglazed tiles (<i>first revision</i>)	(Part 12) : 2006	Determination of resistance to deep abrasion — Unglazed tiles (<i>first revision</i>)
(Part 4) : 2006	Determination of linear thermal expansion (<i>first revision</i>)	(Part 13) : 2006	Determination of scratch hardness of surface according to Mohs (<i>first revision</i>)
(Part 5) : 2006	Determination of resistance to thermal shock (<i>first revision</i>)	(Part 14) : 2006	Determination of impact resistance by measurement of coefficient of restitution
(Part 6) : 2006	Determination of modulus of rupture and breaking strength (<i>first revision</i>)	(Part 15) : 2006	Ceramic tiles — Sampling and basis for acceptance (Superseding IS 13711 : 1993)
(Part 7) : 2006	Determination of chemical resistance — Unglazed tiles (<i>first revision</i>)	13712 ¹⁾	Ceramic tiles — Definitions, classifications, characteristics and marking
(Part 8) : 2006	Determination of chemical resistance — Glazed tiles (<i>first revision</i>)		

¹⁾ Under Revision.

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Amendments Issued Since Publication

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